

Claims

1. A method of selecting operational parameters of a communication network, characterised by;

5 searching an operational parameter space using a multiple objective simulated annealing (MOSA) process wherein;

the objectives are based upon performance indicators of the communication network;

10 the MOSA process generates an archive of estimated values of a Pareto front; and

the MOSA process employs a dominance-based energy function.

15 2. A method according to claim 1, wherein the dominance-based energy function, $E(x)$, is defined substantially as

$$E(x) = \mu(\tilde{F}_x),$$

where μ is a measure defined on \tilde{F}_x , and \tilde{F}_x is defined

20 substantially as

$$\tilde{F}_x = \{y \in \tilde{F} \mid y \prec x\},$$

such that \tilde{F}_x is the set of elements of \tilde{F} that dominate solution x , where \tilde{F} is the union of the current set of mutually non-dominating solutions found, with the current
25 solution x and the proposed perturbed solution x' .

3. A method according to any one of the preceding claims, wherein the difference in the dominance-based energy function between current solution x and proposed
30 perturbed solution x' is evaluated substantially as

$$\delta E(x, x') = \frac{1}{|\tilde{F}|} (|\tilde{F}_x| - |\tilde{F}_{x'}|),$$

all terms as defined herein.

4. A method according to any one of the preceding claims, wherein additional values of the estimated Pareto front are obtained by randomly sampling an attainment
5 surface of the archive of estimated values of the Pareto front.
5. A method according to any one of the preceding claims, wherein the MOSA process may propose a
10 perturbation to the present solution x that is scaled using one of two scaling schemes;
- i. transversal scaling
 - ii. location scaling
- 15 6. A method according to any one of the preceding claims, wherein objectives may be based upon performance indicators of the communication network from any or all of the following categories;
- i. Capacity;
 - 20 ii. Coverage; and
 - iii. Quality of service.
7. A method according to any one of the preceding claims, wherein cost values are applied the objectives
25 and/or the operational parameters according to a given scenario.
8. A method according to claim 7, wherein the solution with the lowest cost within the archive of estimated
30 values of the Pareto front is chosen for a given scenario.
9. A method according to any one of the preceding claims, wherein the operational parameter values

associated with a chosen solution are incorporated within the communication network.

10. A method of selecting operational parameters of a
5 communication network according to claim 1 and
substantially as hereinbefore described with reference to
the accompanying drawings.